

Drowsiness Detection Using Ir Sensor

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Abstract:

Drowsiness is one of the major factors for road accidents. According to the recent survey it accounts for nearly 40% of Road Accidents due to drivers dozing off. For preventing these kind of accident from occurring and to alert the drivers there are many exiting systems which are designed using several methodologies. Most of these Systems have camera as their input parameters. This Paper is an example for IOT based Drowsiness Detection system using IR sensor. Here IR based eye sensor is used to detect the eye blink of the

drivers. Arduino nano is used for drowsy devices detection and other eye blink related detections.

Keywords: *Drowsiness, Detection, IR Sensor, Receiver Transmitter, Eye blink.*

I. INTRODUCTION

Drivers driving with drowsiness are one of the major factors for causing road accidents. The danger, risk and other tragic factors results of drowsy driving are alarming. Drowsy driving is the harmful combination of sleepiness, fatigue or continuous driving. This usually happens when a driver has not slept enough time, but it can also happen because of lack of attention, medications, sleep disorder, drinking alcohol or based on shift work. They cannot predict when sleep can come through their body, Even though falling asleep behind the wheel is dangerous but being sleepy affect the said person's ability to drive safely even if they are not falling asleep. It is estimated that one among every 20 drivers have fallen asleep while driving. The main person who are susceptible to drowsy driving can be Truck drivers, Bus drivers who are in for a long 10-12 hours' drive. These persons are more dangerous to other drivers than they are to themselves. This is due to the fact that large vehicles can cause more harm to small vehicles like car, Bi-cycle, Bikes etc. There are also few drivers with sleep apnea, where there are susceptible to breathing stopping and stating. Drivers who use prescribed medications also makes to feel them drowsy, people who sleep less than 6 hours are more likely to fall asleep behind the wheels.

Some Of The Impact Of Drowsiness In Driving Are:

1. The lack of reaction time on awareness of hazards and sustaining attention makes the driver worsen due to the drowsiness.
2. The continuous driving for more than 20 hours without sleep or rest is equivalent to the driving with blood alcohol concentration of 0.08%.

It causes three times more likely to be in a car crash iff fatigued. Some drivers might not even know that he or she is fatigued since drowsiness is difficult to identify. Some drivers also experience mini sleep. Which are short, involuntary periods of inattention. But this is dangerous as the short 4-5 seconds can cause great harm and danger. More than 1.5 lakh people have lost their life due to Road accidents. The Ministry of Road Accidents in India which shows a daily average of 1280 crashes and 417 deaths which roughly means that 53 crashes and 17 deaths per hour. To prevent such accidents Safety measures devices can be provided. The vehicles should be assisted with auto-mated safety system which alerts driver by providing required safety measures to the devices. The vehicles should be assisted with auto-mated safety system which alerts driver using eye blink sensor. The variation across the eye gets varied based on eye blink. It results in high output if the eye is closed else it results in low if the eye is opened. Arduino takes the input and provides output in the form of alarm or button sound.

II. Existing System

Mostly the existing system consists of camera which is fixed in front of the driver. It detects the driver's face and eye in order to find whether he is drowsy or not. But while faced in front of the driver it blocks the frontal view of the driver. Thus, it can cause more difficulties while driving. So, this System is not advisable. More-over it shows different results based on the position of the eye. When the eye is in uplink position the result shows 80% accuracy while downlink position the result falls to 55% accuracy. It states that the cv only detects 40% of face of the driver whereas in oblique position it fails. Also, the existing system is not suitable for heavy and large vehicles. In order to overcome this dilemma, we have prepared a new detection system of this project.

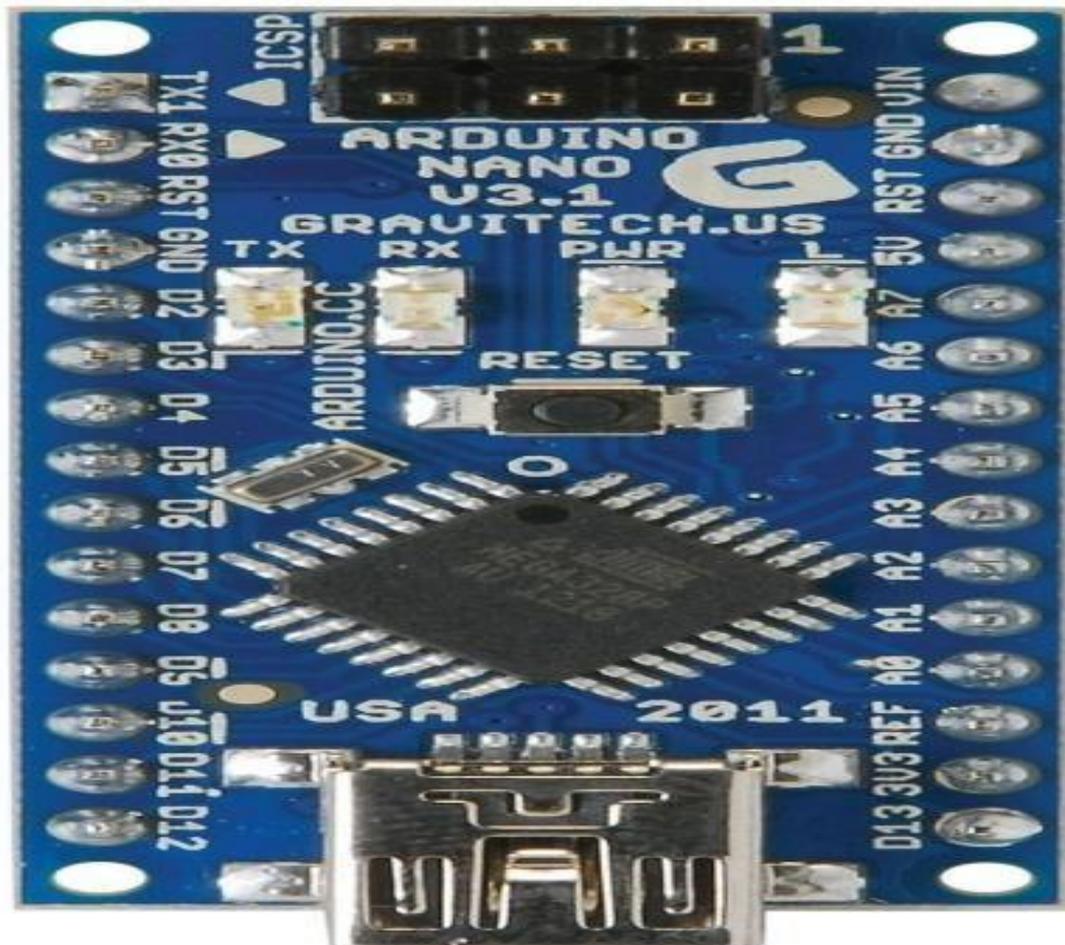
III. Implementation And Methodology

The Proposed system is intended to overcome the draw backs of existing system. In the proposed system we are using a spectacle from of IOT based component. This system alerts the driver from being drowsy or fatigue. The hardware component used for the proposed system are mentioned below.

1. IR Sensor
2. Arduino Nano
3. Battery
4. Buzzer
5. Glass

A. IR Sensor

The IR sensor is used as a eye blink sensor which helps to detect the eye blink of the driver. The IR Sensor consists of infra-red transmitter and received by the IR receiver .The Transmitter and receiver are fixed in the glass parallel to each other.



B. Arduino Nano

Arduino Nano is a open source electronic platform. It is easy to use and it works as both hardware and software. The boards can able to read the inputs and convert it into output. The Arduino works by connecting using USB connecting using USB cable to the computer, Here Arduino Nano is being used in the proposed system as its working are similar to Arduino

Nano and its smaller in size, compatible and breadboard friendly

It detects the eye movement of the driver and the eye variation are noted. The noted variations are taken as input by the Arduino and produces the output. If the eyes are closed, the output will be high otherwise the output will be low and it alerts the driver by giving a buzzer system.

C. Battery

Fig.3 Arduino Nano

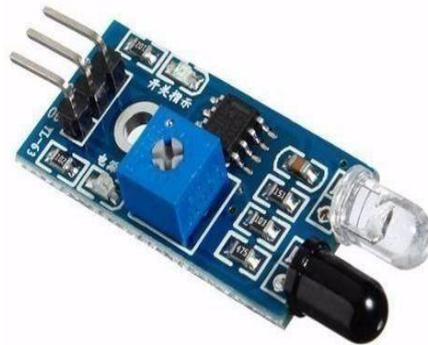


Fig.1 IR Sensor

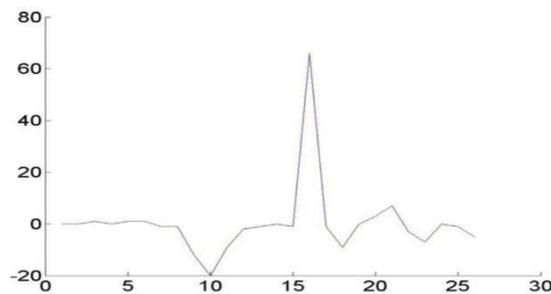


Fig.2 Graph

The Battery is used for providing power supply. The Battery is connected to the Arduino power Board of the sensor and used for the purpose of providing +9v power supply. The Battery is very important as it is used in the working of the drowsiness detection system.

D. Buzzer

The Buzzer is used for the purpose of giving an alarm helps to alert the driver if he/she is sleepy. The buzzer is in connection with the IR sensor. When the driver exceeds a particular time limit upon which he/she has been blinking then the buzzer gives up a buzz/alarm to let the driver know that he/she is sleepy.

When the vehicle is about to be started it is very important to make sure that the buzzer is functioning properly because if the buzzer is mal-functional then it won't give out a buzz. Thus even if the driver blink a lot or is drowsy he won't be given a alert which in turn will make the driver assume that he is not drowsy which can be fatal.

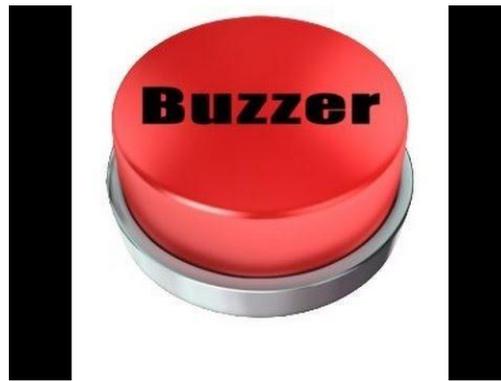


Fig.4 Buzzer

E. Glass

The Glass is the most important apparatus in the IR sensor. The driver must wear the glass which consists of a transmitter -receiver .The transmitter is connected to the right end of the the glass while the receiver is connected to the left end of the glass. The Transmitter send a IR signal to the receiver. When the driver blink the signal is cut off. The time duration is measured and if the driver eyes are closed for more than a particular duration signal is sent to the buzzer which then let a buzz to alert the driver.



Fig.5 Glass

F. Methodology

The IOT based Drowsiness detection system that detects the Driver's Drowsiness level over the spectacles to the user by a buzzer sound. You can also program the timing of the system in such a way that it detects the eye according to the intervals of time. Immediately buzzer sound will arise which denotes the driver is drowsy.

G. Working

We use a Nano -Arduino which is connected to the optical glass and buzzer chip which is

connected to the battery is fixed on the other side .The Ground wire which is connected from Buzzer to Arduino of the D2 Pin. From the eye Blink Sensor the wire is connected to the A2 Pin. After giving the connection the code is generated in the system when we blink the sensor detects from Transmitter-receiver. Such that the sensor drowsiness can be detected.

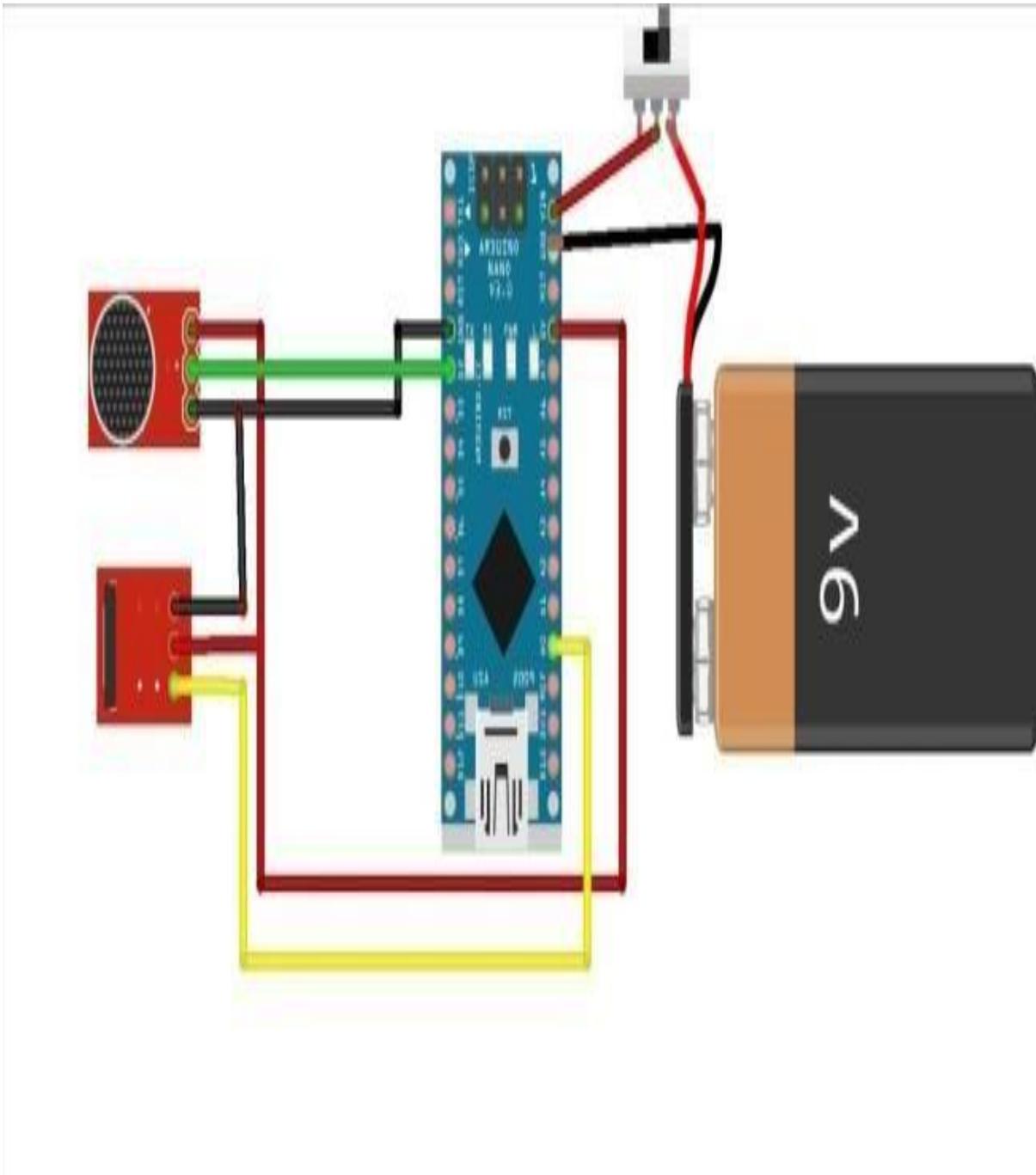


Fig.6 Basic Circuit Diagram of IR Sensor

IV. COMPARATIVE ANALYSIS

This is the comparative Analysis between Camera view and IR Sensor. We can clearly see that IR Sensor detection method is much more beneficiary. So IR detection system can be used in- place of camera view for drowsiness detection.

IR Sensor	Camera view
IR Sensors use a short wave-length to illuminate an area	In camera view Infra-red energy is reflected and interpreted to generate a image
IR Sensors are not affected by smoke oncoming headlights, haze etc.	Camera view are susceptible to be affected by headlights or haze
IR Sensors are cost efficient	Camera view is generally costlier
IR sensors are capable of measuring the heat being emitted by an object and detecting motion	Camera view is in which the camera is placed in-front of the driver and it monitors the driver drowsiness.
IR sensors are size compatible	Camera views are not size compatible.
This method is practically applicable	This method sometimes can cause trouble to the driver since it is in front of him/her
Helps in decreasing Road accidents	Even though this also helps in decreasing road accidents its much lower than IR Sensor
IR accuracy percentile is constant for both up-link as well as down-link eye movements	Its accuracy percentile varies from 80 percent to 55 percent for uplink and downlink movement.

Table.1 Comparative Analysis

V. ADVANTAGES

This detection method is very applicable to any kind of vehicles. It can be used for commercial vehicles. This system is very efficient for heavy vehicles, since the drivers have long driving periods. This system is very efficient for heavy vehicles. Since the drivers face the issue of long driving periods. This system helps to avoid vehicle crashes related to drowsiness.

CONCLUSION AND FUTURE WORK

The drowsiness detection is used for detecting drowsiness in rapid manner. This system prevents the driver from the fall of sleepiness state while driving. The buzzer alerts the driver if the eyes are closed for some seconds which can be modified in the code. This paper is actually made for safety of the drivers from accidents due to drowsiness. It can be implemented in all kind of vehicles.

As a future work, this system can be developed with some modification that detects comma patients whether they recovered from it. This system can be implemented in cars also. It may focus on the utilization of other outer factors like sleeping hours, vehicle state, weather conditions, and mechanical data for fatigue measurements.

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